DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name: Reichhold Chemicals, Inc.
Facility Address: 3320 Lincoln Avenue, Tacoma, WA 98421
Facility EPA ID #: WAD 00925 2891

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

__X__ If yes - check here and continue with #2 below.

_____ If no - re-evaluate existing data, or

_____ if data are not available skip to #6 and enter"IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater	_X_	___	___	**see below**
Air (indoors)[2]	___	_X_	___	
Surface Soil (e.g., <2 ft)	_X_	___	___	
Surface Water	___	___	_X_	
Sediment	___	_X_	___	
Subsurf. Soil (e.g., >2 ft)	_X_	___	___	
Air (outdoors)	____	___	_X_	

_____ If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

__X__ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_____ If unknown (for any media) - skip to #6 and enter "IN" status code.

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

Rationale and Reference(s):

Site Description

The Reichhold facility is a former chemical manufacturing site located on 52 acres in Tacoma's Commencement Bay tideflats. The area is predominantly heavy industry. The facility is approximately 800 feet from Blair Waterway and 1000 feet from Hylebos Waterway. Although there is a groundwater mound under the site - particularly in the shallow aquifer, groundwater flow is generally towards Blair Waterway. Reichhold manufactured chemicals, including pentachlorophenol, from the mid-1950s through the early 1990s. There are currently no manufacturing activities at the site. Soils and groundwater have been contaminated due to past site practices. A groundwater pump and treat system and shallow interceptor drain have operated at the site since 1993. A few of the contaminated source areas have been excavated and the soils removed or placed in a lined bioremediation cell for treatment. See attached site map.

Groundwater:

HIGHEST LEVEL OF CONSTITUENTS FOUND IN GROUNDWATER
(all units ug/l)

Constituent	GWPS*	Historical** Level (well#)	Current*** Level(well#)
Pentachlorophenol	50	13,000 (30I)	27,000 (14S)
Formaldehyde	50	200,000 (2S)	150 (50I)
Molybdenum	15	52,000 (56S)	4500 (56S)
2,4-Dichlorophenol	100	950 (14S)	1100 (14S)
2,4,6-Tri-chlorophenol	1.2	1200 (14S)	23,000 (14S)
Trichloroethene	5	180 (30I)	46 (14S)
Benzene	5	130 (2I)	14 (30I)
Vinyl Chloride	2	65 (53I)	310 (48I)

*Groundwater Protection Standard in 1988 permit
** Historical: Highest concentration of constituent reported between 1986 and 1992. The groundwater treatment system became operational in 1993.
*** Current: Highest concentration of constituent reported in recent groundwater sampling events (Apr97, Aug97, Apr98, Jul99).

In addition to the compounds listed in the above table, the following constituents are currently (within the past two years) found in the groundwater exceeding the groundwater performance standards: trans-1,2-Dichloroethene, 2,3,4,6-tetrachlorophenol, 2-chlorophenol, 4(1,1)-Dimethylethyl phenol, 4-methylphenol, 2-benzyl-4-chlorophenol, naphthalene, antimony, arsenic, chromium, cobalt, copper, manganese, nickel, zinc, and cyanide.

Surface Soil/Subsurface Soil

Both surface soils and subsurface soils at the facility contain contaminants in excess of the soil clean up standards included in the 1988 permit. The contaminants driving cleanup at the site are pentachlorophenol and PCBs. These contaminants have been reported as high as 3,660,000 ug/kg (penta) and 1,022,000 ug/kg (PCBs) in areas of the site that have not yet been excavated. Other contaminants in the soil include other semi-volatile compounds, especially phenols (2,4,6-Trichlorophenol, 2,4-Dichlorophenol, phenol, etc); volatile compounds; and metals.

Surface Water

It is believed that surface water contamination has been minimized due to ongoing measures controlling surface runoff and groundwater discharge to surface water. However, there is concern that complete control of the groundwater plume has not been demonstrated. It is unknown how much, if any, contaminated groundwater reaches Blair Waterway.

Outdoor Air

Outdoor Air sampling results have not been reported or required for this facility. At times there is a phenolic odor on site, particularly after any recent excavating. It is unknown whether releases to the air exceed appropriately protective risk based levels.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

	Potential **Human Receptors** (Under Current Conditions)						
"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater	___	___	___	_x_			___
Air (indoors)	___	___	___				
Soil (surface, e.g., <2 ft)	___	_x_	___	_x_	___	___	___
Surface Water	___	___			___	_?_	_?_
Sediment	___	___			___	___	___
Soil (subsurface e.g., >2 ft)		_x_		_x_			___
Air (outdoors)	___	_x_	___	_x_	___		

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated") as identified in #2 above.

2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

_____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

__x__ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

Pathways

Workers: Workers on site may be exposed to contaminated surface soils which have not been covered or from areas where the cover has been removed for site remediation activities. Additionally, the presence of and manipulation of excavated surface and subsurface soils in the bioremediation cells may cause workers to be exposed to contaminants in soils, dust, and in the air. Workers are exposed to what contaminants may exist in the outdoor air.

Construction: Construction and remediation activities on site or nearby may expose workers to contaminants in groundwater, surface soils, subsurface soils, and outdoor air.

Recreation: There are no recreation activities on site. Recreational use of the nearby waterways is limited, but present. Complete control of the groundwater plume has not been demonstrated. It is unknown whether any contaminated groundwater reaches nearby waterways.

Food: As per agreement with EPA, Reichhold no longer allows food products to be stored on site. There may be some subsistence and other fishing and or food collection activities in and along the nearby waterways. Complete control of the groundwater plume has not been demonstrated. It is unknown whether any contaminated groundwater reaches nearby waterways.

Residences: No pathways are complete to residences because there are no residential areas on site, immediately adjacent to the site, or above the contaminated groundwater plume.

Day Care: No pathways are complete to day care centers because there are no known day cares on site or nearby.

Trepassers: No pathways are complete to trespassers because the site is fenced and locked at all times. While there is a chance that trespassers could gain access to the facility by climbing the fence, it was determined that this institutional control satisfies the criteria for interrupting this pathway.

4 Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

_____ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

__x__ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

_____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

Rationale and Reference(s):

Complete Pathways/Significant Exposure

Workers: It is assumed the exposure to workers from surface soils is not significant because ingestion due to dust is limited by surface cover, vegetation, and the NW's wet climate. Exposures from outdoor air contaminants are not likely to be significant. However the periodic mixing/turning of soils in the bioremediation cells may pose a significant risk to workers. These soils contain high levels of site contaminants. Although the beds are maintained at high water content, dust from dryer surface areas or volatiles may be released during mixing in the cells. The facility has not prepared a health/safety plan or otherwise formally addressed the risk associated this activity.

Construction: There are not ongoing construction activities at the site. Construction workers exposed to site contamination are likely to be exposed for such a short duration that the exposure would not be significant. If construction activities increase at the site due to redevelopment, this pathway may need to be re-examined.

Recreation: Exposures to recreational users of the nearby waterways are not significant due to limited duration of exposure, uncertainty regarding whether any contaminants reach the waterway, and mixing of any contaminants in the waterway.

Food: It is unknown whether any contaminants reach the waterways via the groundwater. Given this uncertainty and the fact that at least a majority of the groundwater plume is under control, exposure from consumption of food taken in or near the waterway is unlikely to be significant. If further studies show that the groundwater plume is not controlled, this pathway must be reassessed.

5 Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

__x__ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s):

It is unknown whether the significant exposures to workers due to mixing of contaminated soils in the bioremediation cells is acceptable. A risk assessment that addresses this activity does not exist .

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

____ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the _____ _____ _____ facility, EPA ID #_____, located at _____ under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - "Current Human Exposures" are NOT "Under Control."

_x__ IN - More information is needed to make a determination.

Completed by (signature copy available in site file) Date _____
Robbie Hedeen
Environmental Scientist

Supervisor (signature copy available in site file) Date _____
Rick Albright
Director, Office of Waste and Chemicals Management
EPA, Region 10

Locations where References may be found:

_____RCRA Site Files_____
_____ U.S. EPA Region 10_____
_____ 1200 Sixth Avenue, WCM-121_____
_____ Seattle, WA 98101_____

Contact telephone and e-mail numbers

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FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.